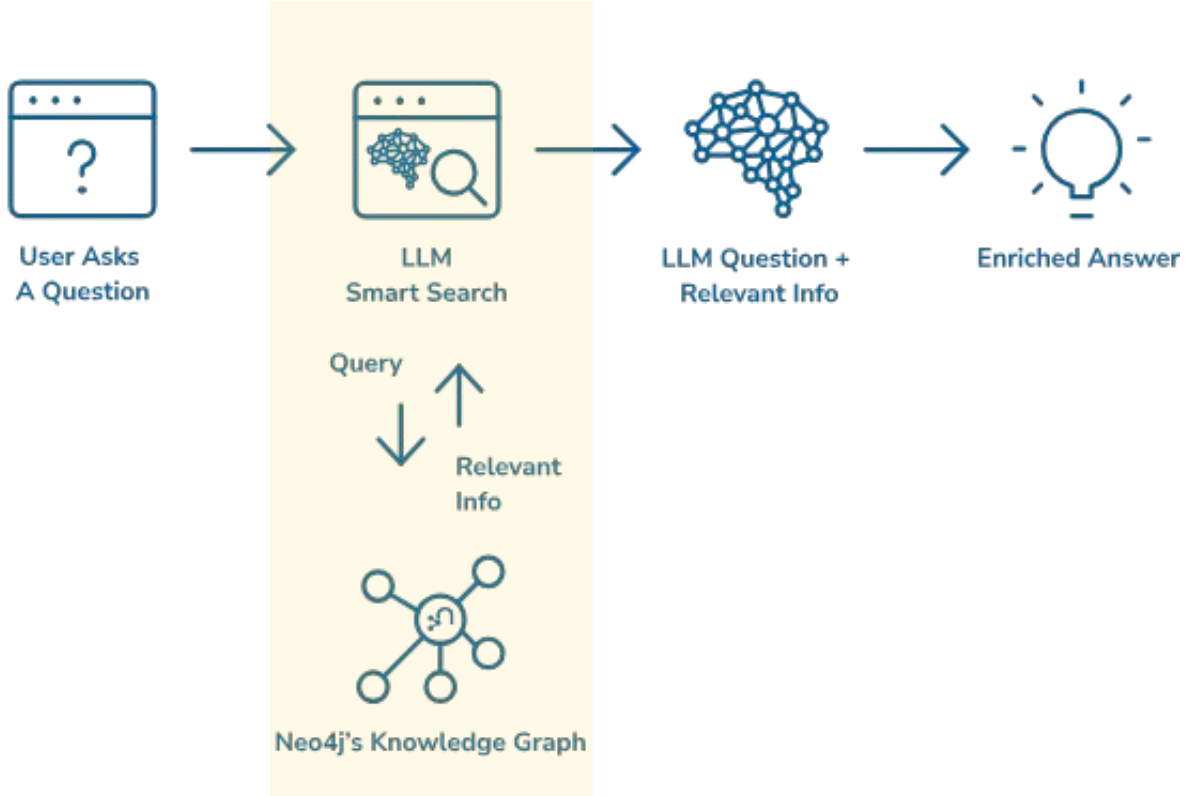
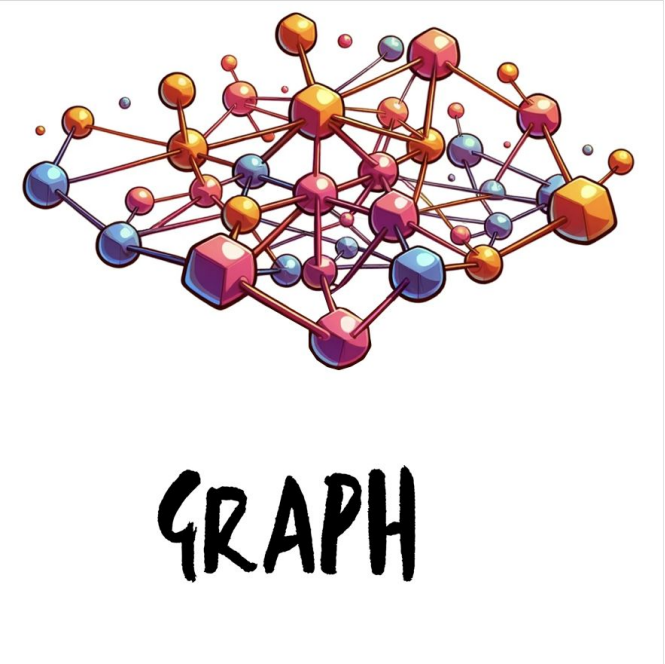
Going Meta #24: KG+LLMs: Ontology driven RAG patterns

Recap from last episode… RAG

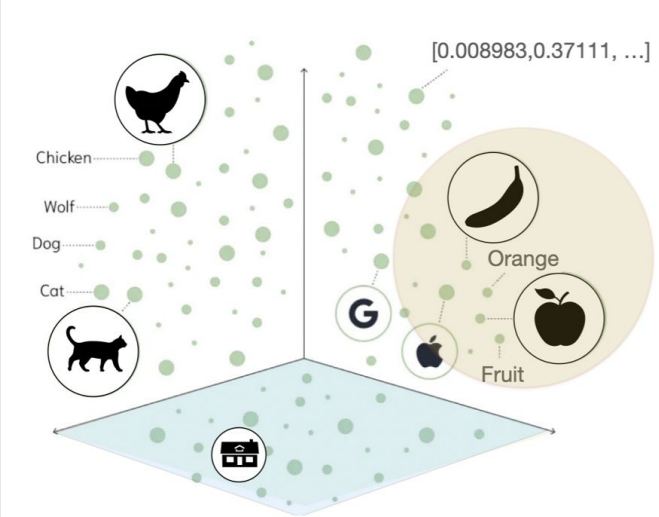


Advanced RAG patterns combine vector & graph…



GRAPH

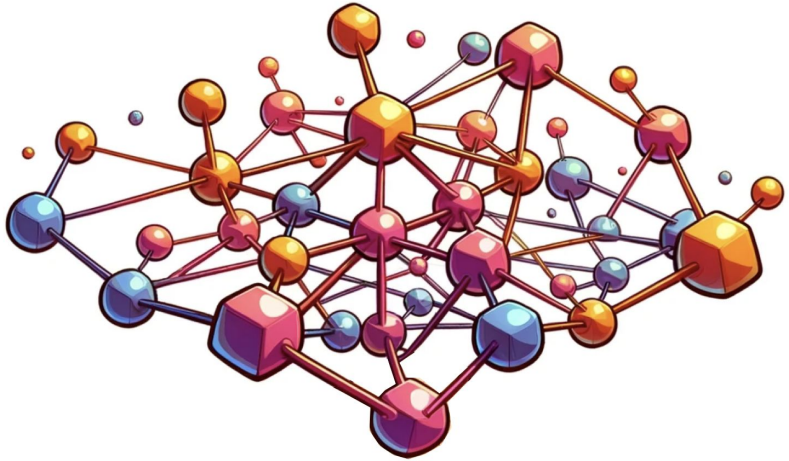
&



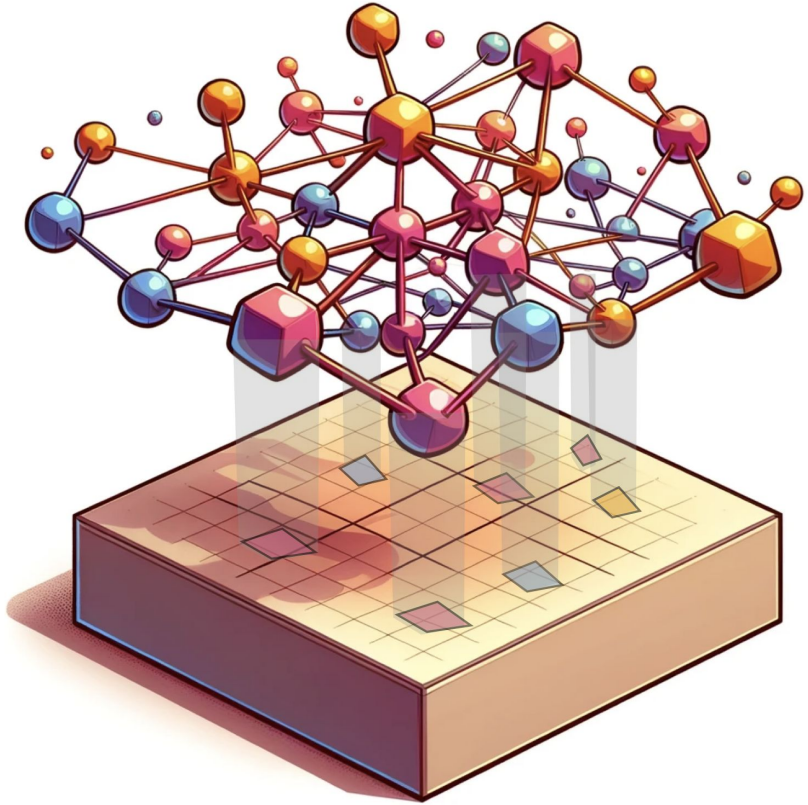
VECTOR

A **Knowledge Graph** captures key enterprise knowledge in the form of **entities and relationships between them**.

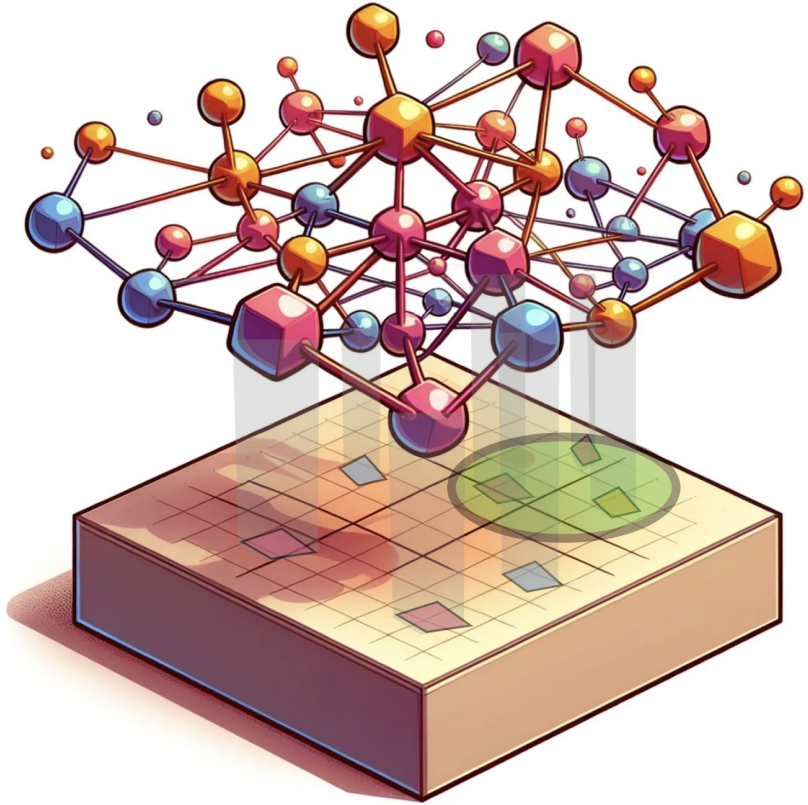
Some nodes in the graph have properties with NL text



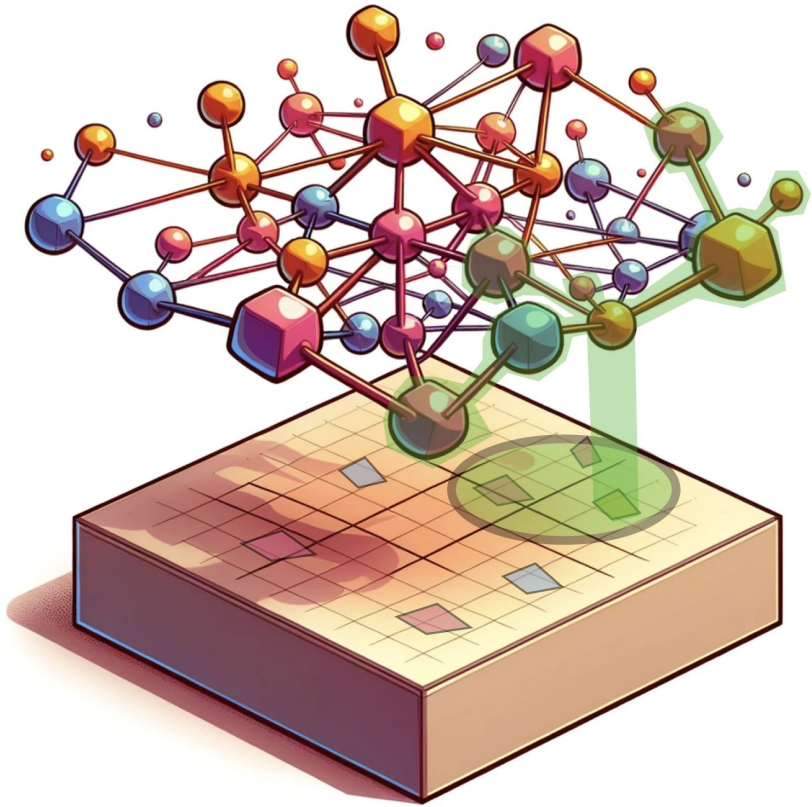
These property values get **embedded** (transformed into a numeric representation) and added to a vector index to enable **vector-based semantic search**.



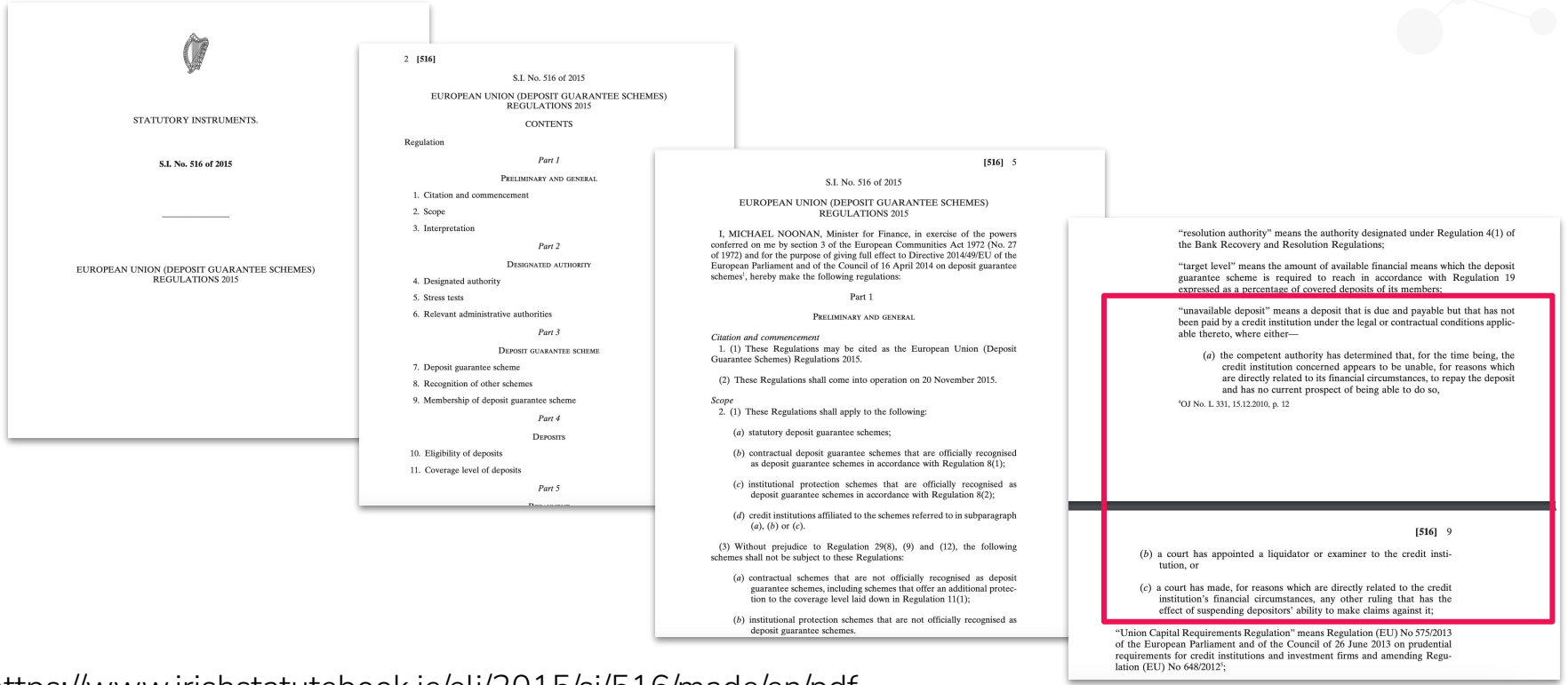
A semantic search on the vector index returns the k **approximate nearest neighbours** to the search concept (word, question, image, etc)



Each result from the vector search is “dereferenced“ to get the corresponding node in the graph and a subsequent **graph exploration** finds **semantically related elements** that enrich and augment the final search result.



Example1: Q&A on document with rich internal structure



STATUTORY INSTRUMENTS.

S.I. No. 516 of 2015

EUROPEAN UNION (DEPOSIT GUARANTEE SCHEMES) REGULATIONS 2015

2 [516]

S.I. No. 516 of 2015

EUROPEAN UNION (DEPOSIT GUARANTEE SCHEMES) REGULATIONS 2015

CONTENTS

Regulation

Part 1

PRELIMINARY AND GENERAL

1. Citation and commencement
2. Scope
3. Interpretation

Part 2

DESIGNATED AUTHORITY

4. Designated authority
5. Stress tests
6. Relevant administrative authorities

Part 3

DEPOSIT GUARANTEE SCHEME

7. Deposit guarantee scheme
8. Recognition of other schemes
9. Membership of deposit guarantee scheme

Part 4

DEPOSITS

10. Eligibility of deposits
11. Coverage level of deposits

Part 5

[516] 5

S.I. No. 516 of 2015

EUROPEAN UNION (DEPOSIT GUARANTEE SCHEMES) REGULATIONS 2015

I, MICHAEL NOONAN, Minister for Finance, in exercise of the powers conferred on me by section 3 of the European Communities Act 1972 (No. 27 of 1972) and for the purpose of giving full effect to Directive 2014/49/EU of the European Parliament and of the Council of 16 April 2014 on deposit guarantee schemes[1], hereby make the following regulations:

Part 1

PRELIMINARY AND GENERAL

Citation and commencement

1. (1) These Regulations may be cited as the European Union (Deposit Guarantee Schemes) Regulations 2015.

(2) These Regulations shall come into operation on 20 November 2015.

Scope

2. (1) These Regulations shall apply to the following:

(*a*) statutory deposit guarantee schemes;

(*b*) contractual deposit guarantee schemes that are officially recognised as deposit guarantee schemes in accordance with Regulation 8(1);

(*c*) institutional protection schemes that are officially recognised as deposit guarantee schemes in accordance with Regulation 8(2);

(*d*) credit institutions affiliated to the schemes referred to in subparagraph (*a*), (*b*) or (*c*).

(3) Without prejudice to Regulation 29(8), (9) and (12), the following schemes shall not be subject to these Regulations:

(*a*) contractual schemes that are not officially recognised as deposit guarantee schemes, including schemes that offer an additional protection to the coverage level laid down in Regulation 11(1);

(*b*) institutional protection schemes that are not officially recognised as deposit guarantee schemes.

"resolution authority" means the authority designated under Regulation 4(1) of the Bank Recovery and Resolution Regulations;

"target level" means the amount of available financial means which the deposit guarantee scheme is required to reach in accordance with Regulation 19 expressed as a percentage of covered deposits of its members;

"unavailable deposit" means a deposit that is due and payable but that has not been paid by a credit institution under the legal or contractual conditions applicable thereto, where either—

(*a*) the competent authority has determined that, for the time being, the credit institution concerned appears to be unable, for reasons which are directly related to its financial circumstances, to repay the deposit and has no current prospect of being able to do so,

[1]OJ No. L 331, 15.12.2010, p. 12

[516] 9

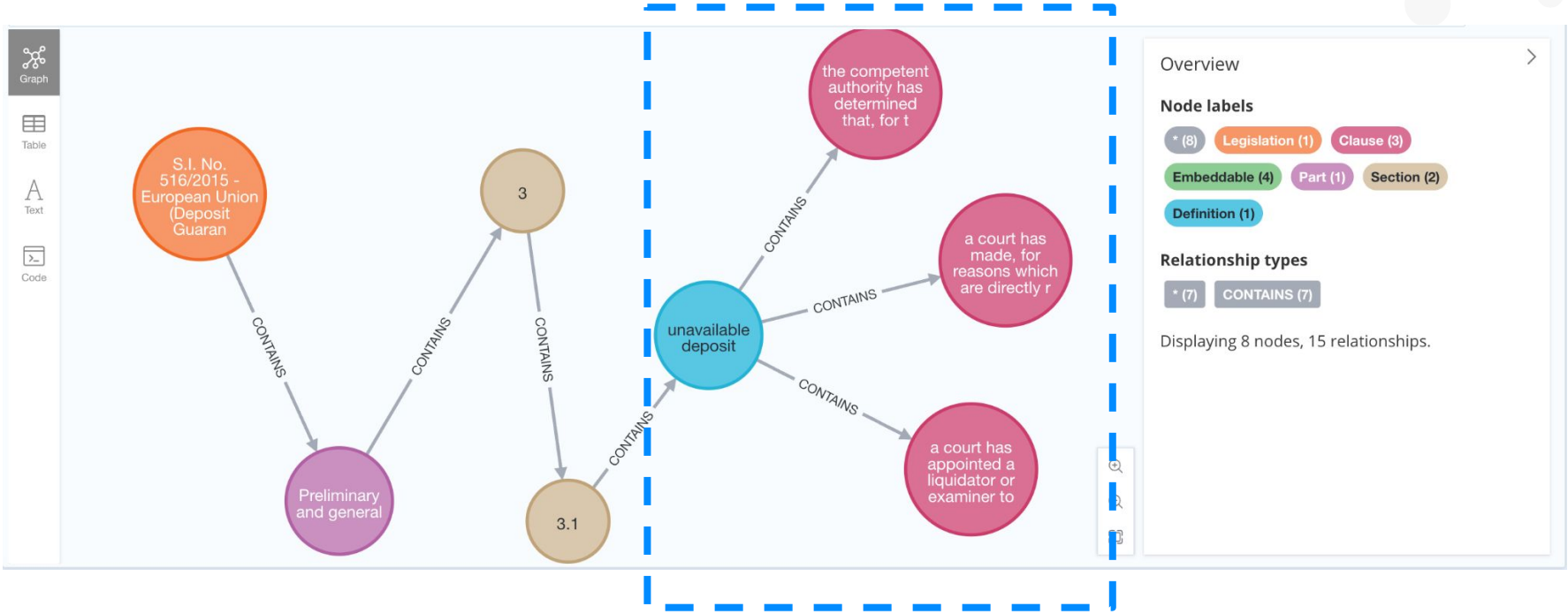
(*b*) a court has appointed a liquidator or examiner to the credit institution, or

(*c*) a court has made, for reasons which are directly related to the credit institution's financial circumstances, any other ruling that has the effect of suspending depositors' ability to make claims against it;

"Union Capital Requirements Regulation" means Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012[2];

https://www.irishstatutebook.ie/eli/2015/si/516/made/en/pdf

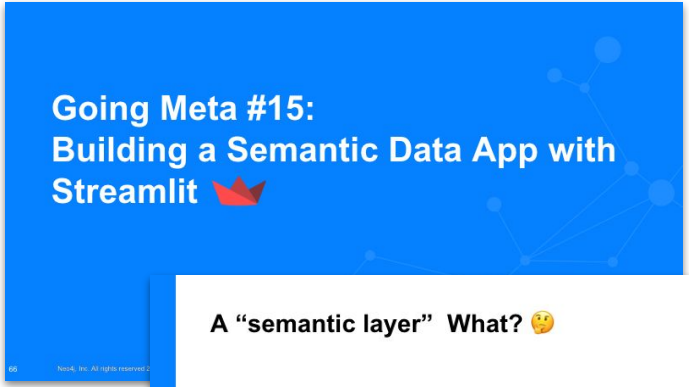
The document as a graph

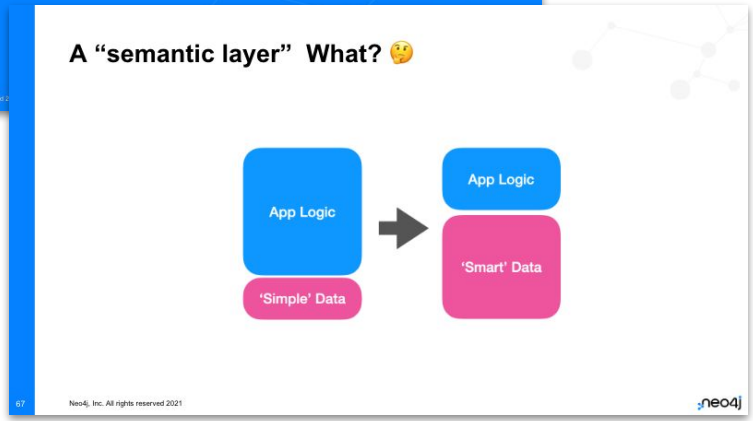


Injecting graph post-processing (powerful 💪 but rigid 😰)

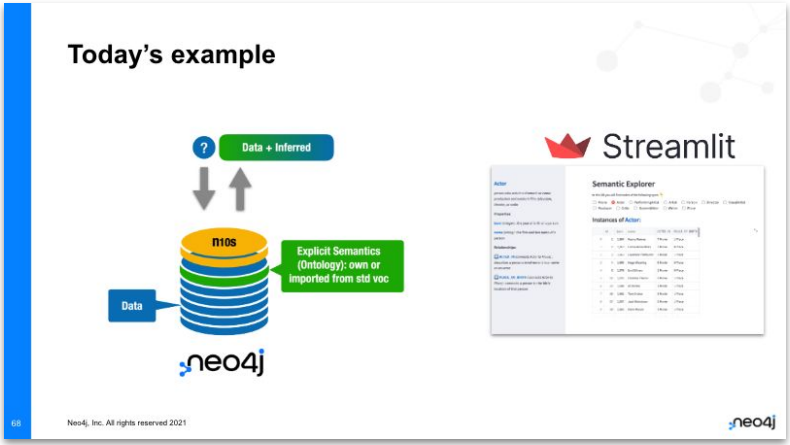
```
contextualize_query = """
…cypher magic…
"""
contextualized_vectorstore = Neo4jVector.from_existing_index(
    OpenAIEmbeddings(),
    url=url,
    username=username,
    password=password,
    index_name="legislation",
    retrieval_query=contextualize_query,
)
```

Let’s go meta!





Remember episode 15?
An “ontology driven” streamlit app



Let’s see some code, ok?